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MOISTURE CONTENT AND SHRINKAGE IN GRAIN.

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MOISTURE CONTENT AND SHRINKAGE IN GRAIN.

INTRODUCTION.

The moisture content and the shrinkage or loss in the weight of grain have been the cause of many misunderstandings between grain merchants and the operators of elevators and commercial grain driers because the shrinkage and the reduction in the percentage of moisture, resulting from the drying of grain, do not correspond. Moreover, since the development of the practical and rapid method for determining the moisture content of grain, as described by Brown and Duvel in a former publication of this Bureau,[a] these misunderstandings have become much more pronounced. Investigations have revealed the fact that occasionally operators of elevators and commercial grain driers have even been accused of rendering insufficient returns on grain dried because the loss in weight due to drying always exceeds the percentage reduction in moisture.

LOSS OF MATERIAL IN HANDLING.

In the handling of grain through an elevator, commercial grain drier, or over a conveyor, there is always a slight loss in weight due to the blowing out of small particles of broken grain, dust, chaff, etc. Likewise, if the air is dry there is usually some loss of water in the case of grain of comparatively high moisture content. On the other hand, if the grain is cold and the atmosphere at the time of "running" is warm and of high relative humidity there may be sufficient condensation of water on the cold grain to cause an appreciable increase in weight. Such variations as these, however, depend principally on the quality and condition of the grain, together with the condition of the atmosphere at the time of handling, and have nothing whatever to do with the difference between the loss in weight and reduction in moisture content as treated in this circular.

[a] Bulletin 99, Bureau of Plant Industry, U. S. Department of Agriculture, 1907.

REDUCTION OF MOISTURE AND SHRINKAGE.

Giving due consideration to the loss of material resulting from the handling of grain through an elevator, drier, etc., the reduction in the percentage of moisture is not the same as the percentage loss in weight, and should not be the same if the moisture content is properly determined and the weighing done correctly, notwithstanding the fact that water is the only substance liberated in the drying process.

WHY THE REDUCTION OF MOISTURE AND THE SHRINKAGE IN GRAIN ARE NOT THE SAME.

The difference between the reduction in the percentage of moisture and the shrinkage exists because there is a constant change of base in making the moisture test. Moisture percentages are calculated on the basis of the wet sample, i. e., 100 grams of grain containing 20 per cent of moisture consist of 80 grams of dry material and 20 grams of free water. For the purpose of demonstration it is assumed that this 100 grams of grain containing 20 per cent of moisture be dried until the weight is reduced to 90 grams. The weight has therefore been reduced 10 per cent. During the drying, 10 grams, or one-half of the water, have been liberated and likewise 10 grams still remain in the grain, but the remaining 10 grams of water are contained in the partially dried grain, which weighs only 90 grams, i. e., ten-ninetieths, or one-ninth of the partially dried grain is water. This fraction expressed in percentage is equivalent to 11.1 per cent, which is the moisture content of the remaining 90 grams of grain. In actual practice the moisture content after drying would not be determined on the 90 grams alone, but a new sample of 100 grams, the same weight as was used for the original test, would be taken and this would contain 11.1 grams, equivalent to 11.1 per cent, of water.

In the illustration here given there has been a reduction in weight from 100 grams to 90 grams, or a shrinkage of 10 per cent. The moisture content of the grain has been lowered from 20 per cent before drying to 11.1 per cent after drying, or a reduction of only 8.9 per cent. The shrinkage in weight therefore exceeds the reduction in moisture by 1.1 per cent. This difference, however, is not constant but depends on the quantity of water originally contained in the grain and the extent to which the drying is carried. Moreover, the difference increases irregularly until the moisture content is reduced approximately one-half, after which it gradually decreases and when the free water is entirely expelled the difference between the shrinkage in weight and the reduction in moisture content equals zero.

These variations are better shown in Table I, in which the original moisture content is taken as 25 per cent. The first part of the table

shows the reduction in moisture content resulting with each 1 per cent of shrinkage. The second part shows the shrinkage corresponding to each 1 per cent of reduction in moisture.

TABLE I.—*Comparative shrinkage in weight and reduction in moisture of grain when the original moisture content is 25 per cent.*

Shrinkage in weight.	Reduction in moisture content.	Excess of shrinkage over reduction in moisture.	Reduction in moisture content.	Shrinkage in weight.	Excess of shrinkage over reduction in moisture.
Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
0	0.00	0.00	0	0.00	0.00
1	.76	.24	1	1.31	.31
2	1.53	.47	2	2.60	.60
3	2.32	.68	3	3.85	.85
4	3.13	.87	4	5.06	1.06
5	3.95	1.05	5	6.25	1.25
6	4.79	1.21	6	7.41	1.41
7	5.65	1.35	7	8.54	1.54
8	6.52	1.48	8	9.64	1.64
9	7.42	1.58	9	10.71	1.71
10	8.33	1.67	10	11.76	1.76
11	9.27	1.73	11	12.79	1.79
12	10.22	1.78	12	13.79	1.79
13	11.21	1.79	13	14.78	1.78
14	12.21	1.79	14	15.73	1.73
15	13.24	1.76	15	16.67	1.67
16	14.29	1.71	16	17.58	1.58
17	15.36	1.64	17	18.48	1.48
18	16.46	1.54	18	19.35	1.35
19	17.59	1.41	19	20.21	1.21
20	18.75	1.25	20	21.05	1.05
21	19.94	1.06	21	21.87	.87
22	21.15	.85	22	22.68	.68
23	22.40	.60	23	23.47	.47
24	23.69	.31	24	24.24	.24
25	25.00	.00	25	25.00	.00

HOW THE DIFFERENCE BETWEEN THE REDUCTION OF MOISTURE AND THE SHRINKAGE IN GRAIN CAN BE DETERMINED.

While these differences vary with the original moisture content and the degree of drying, they can be determined readily by simple calculation.

Shrinkage.—To find the final weight and shrinkage on any given lot of grain or other substance which has been dried, the original weight and the moisture content before and after drying being given, the following simple proportion may be used:

$$\left\{\begin{array}{c}\text{Percentage of dry matter after drying}\end{array}\right\} : \left\{\begin{array}{c}\text{Percentage of dry matter before drying}\end{array}\right\} :: \left\{\begin{array}{c}\text{Original weight}\end{array}\right\} : \left\{\begin{array}{c}\text{Final weight.}\end{array}\right.$$

By multiplying the third term by the second and dividing the product by the first term the quotient will be the final weight.

Therefore the original weight less the final weight equals the shrinkage.

If the original weight is taken as 100 per cent, which can always be done, the shrinkage found will be in percentage, but if it is desired

to express the shrinkage in terms of bushels or pounds the calculation may be made as in the following example:

Problem.—What will be the shrinkage in weight on 1,000 bushels of corn if the moisture content is reduced from 25 per cent to 15 per cent?

Dry matter after drying = 100 − 15 = 85 per cent.
Dry matter before drying = 100 − 25 = 75 per cent.
Original weight of corn = 1,000 bushels.

Therefore 85 per cent : 75 per cent :: 1,000 bushels : final weight.

Completing the proportion by multiplying 1,000 by 75 and dividing the product by 85 the final weight is found to be 882.4 bushels, giving a shrinkage equivalent to 117.6 bushels, or 11.76 per cent. The shrinkage in this case exceeds the reduction in moisture content by 1.76 per cent.

For additional data see Tables II and III.

Moisture.—To find the final moisture content of any given lot of grain or other substance which has been dried, the moisture content before drying and the weight before and after drying being known, the following simple proportion may be used:

$$\left.\begin{matrix}\text{Weight}\\ \text{after drying}\end{matrix}\right\} : \left\{\begin{matrix}\text{Original}\\ \text{weight}\end{matrix}\right\} :: \left\{\begin{matrix}\text{Percentage of dry matter}\\ \text{in original}\end{matrix}\right\} : x.$$

x = percentage of dry matter after drying.

Therefore 100 less x equals the percentage of moisture remaining after drying.

The following will serve as an example:

Problem.—If 1,000 bushels of grain containing 25 per cent of moisture are reduced to 900 bushels on drying, what will be the percentage of moisture in the dried grain?

900 bushels : 1,000 bushels :: 75 per cent : x.

Completing the proportion by multiplying 75 by 1,000 and dividing the product by 900, the value of x is found to be 83.33 per cent, which is the percentage of dry matter remaining after drying. Therefore 100 per cent less 83.33 per cent equals 16.67 per cent, which is the moisture content of the dried grain.

The grain originally contained 25 per cent of moisture, which was reduced to 16.67 per cent, or a decrease in moisture content of 8.33 per cent as the result of drying. At the same time the weight was reduced from 1,000 bushels to 900 bushels, or a shrinkage of 10 per cent. The shrinkage in weight, therefore, exceeded the reduction in moisture by 1.67 per cent.

For additional data pertaining to moisture see Tables III and IV.

If it is desired to find the original moisture content when the final moisture content and the weight before and after drying are known, the terms of the foregoing proportion in the following order may be used:

$$\left.\begin{matrix}\text{Original}\\ \text{weight}\end{matrix}\right\} : \left\{\begin{matrix}\text{Weight after}\\ \text{drying}\end{matrix}\right\} :: \left\{\begin{matrix}\text{Percentage of dry mat-}\\ \text{ter after drying}\end{matrix}\right\} : \left\{\begin{matrix}\text{Percentage of dry mat-}\\ \text{ter in original.}\end{matrix}\right.$$

Completing the proportion in the same manner as already described and subtracting the result so obtained from 100 per cent will give the percentage of moisture contained in the grain before drying.

EXPLANATION OF TABLES.

Table II shows the loss in weight resulting from the partial or complete drying of grain having a moisture content below 41 per cent. Thus, if the original moisture content, shown at the top of each column in the body of the table, and the reduction in moisture, shown in the column on the left, are known the shrinkage can be read direct from the table. For example, if the original moisture content of a sample of grain is 19 per cent and the moisture content of the grain represented by such sample is reduced by drying to 15 per cent, involving a loss of moisture of 4 per cent, proceed as follows: Run down the column under the heading "Loss in moisture," at the left of the table, until the figure 4 is reached; follow the line of figures opposite 4 to the right as far as the column headed 19 (original moisture content). The 4.70 per cent in this column is the loss in weight, or shrinkage, which corresponds to a loss of 4 per cent moisture in 19 per cent of grain. Had the original moisture content been 26 per cent the loss in moisture resulting from the drying would have been 11 per cent. In column 26, opposite 11, is 12.94 per cent, which would be the shrinkage if the moisture had been reduced from 26 to 15 per cent as in the case assumed.

Table III differs from Table II in that it shows the loss in moisture corresponding to each unit loss in weight. The method of reading the table, however, is the same.

Table IV differs from Tables II and III in that the final moisture content can be read direct. This table will be of special value to operators of grain driers in that the final moisture content of the grain can be ascertained very closely without making the test, provided the moisture content of the grain before drying and the weight before and after drying are known, not of course taking into consideration any loss due to the blowing out of chaff, dirt, etc. The readings are made the same as described for Table II—i. e., in the column on the left find the number corresponding to the loss in weight; opposite this number in the column indicating the original moisture content will be found the percentage of moisture in the grain after drying. For example, if the original moisture content is 20 per cent and the loss in weight is 5 per cent the final moisture content, as shown in column 20, opposite 5, is found to be 15.79 per cent.

TABLE II.—*Percentage of loss in weight of grain resulting from drying, the loss in moisture and the original moisture content being given.*

Loss in moisture.	Original moisture content (per cent)—																			
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Per cent.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1	1.00	1.01	1.02	1.03	1.04	1.05	1.06	1.07	1.09	1.10	1.11	1.12	1.13	1.15	1.16	1.18	1.19	1.20	1.22	1.23
2	.....	2.00	2.02	2.04	2.06	2.08	2.10	2.13	2.15	2.17	2.20	2.22	2.25	2.27	2.30	2.33	2.35	2.38	2.41	2.44
3	.....	.....	3.00	3.03	3.06	3.09	3.12	3.16	3.19	3.23	3.26	3.30	3.33	3.37	3.41	3.45	3.49	3.53	3.57	3.61
4	.....	.....	.....	4.00	4.04	4.08	4.12	4.17	4.21	4.26	4.30	4.35	4.39	4.44	4.49	4.54	4.60	4.65	4.70	4.76
5	.....	.....	.....	.....	5.00	5.05	5.10	5.15	5.21	5.26	5.32	5.38	5.43	5.49	5.55	5.62	5.68	5.75	5.81	5.88
6	.....	.....	.....	.....	.....	6.00	6.06	6.12	6.19	6.25	6.31	6.38	6.45	6.52	6.59	6.67	6.74	6.82	6.90	6.98
7	.....	.....	.....	.....	.....	.....	7.00	7.07	7.14	7.22	7.29	7.37	7.45	7.53	7.61	7.69	7.78	7.87	7.95	8.05
8	.....	.....	.....	.....	.....	.....	.....	8.00	8.08	8.16	8.25	8.34	8.42	8.51	8.60	8.70	8.79	8.89	8.99	9.09
9	.....	.....	.....	.....	.....	.....	.....	.....	9.00	9.09	9.18	9.28	9.38	9.47	9.57	9.68	9.78	9.89	10.00	10.11
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.00	10.10	10.20	10.31	10.42	10.53	10.64	10.75	10.87	10.99	11.11
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11.00	11.11	11.22	11.34	11.46	11.58	11.70	11.83	11.96	12.09
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.00	12.12	12.25	12.37	12.50	12.63	12.77	12.90	13.04
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13.00	13.13	13.27	13.40	13.54	13.68	13.83	13.98
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14.00	14.14	14.29	14.43	14.58	14.74	14.89
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15.00	15.15	15.31	15.46	15.63	15.79
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16.00	16.16	16.33	16.50	16.67
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17.00	17.17	17.35	17.53
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.00	18.18	18.37
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19.00	19.19
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20.00
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Loss in moisture.	Original moisture content (per cent)—																			
	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
Per cent.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1	1.25	1.27	1.28	1.30	1.31	1.33	1.35	1.37	1.39	1.41	1.43	1.45	1.47	1.49	1.51	1.54	1.56	1.59	1.61	1.64
2	2.47	2.50	2.53	2.56	2.60	2.63	2.67	2.70	2.74	2.78	2.82	2.86	2.90	2.94	2.98	3.03	3.08	3.12	3.17	3.23
3	3.66	3.70	3.75	3.80	3.85	3.90	3.95	4.00	4.05	4.11	4.17	4.23	4.29	4.35	4.41	4.48	4.54	4.61	4.69	4.76
4	4.82	4.88	4.94	5.00	5.06	5.13	5.19	5.26	5.33	5.40	5.48	5.55	5.63	5.72	5.80	5.88	5.97	6.06	6.15	6.25
5	5.95	6.02	6.10	6.17	6.25	6.33	6.41	6.49	6.58	6.67	6.76	6.85	6.94	7.04	7.14	7.25	7.35	7.46	7.57	7.69
6	7.06	7.14	7.23	7.32	7.41	7.50	7.60	7.69	7.79	7.89	8.00	8.11	8.22	8.33	8.45	8.57	8.70	8.82	8.96	9.09
7	8.14	8.24	8.33	8.43	8.54	8.64	8.75	8.86	8.97	9.09	9.21	9.33	9.46	9.59	9.72	9.86	10.00	10.14	10.29	10.45
8	9.20	9.30	9.41	9.52	9.64	9.76	9.88	10.00	10.13	10.26	10.39	10.53	10.67	10.81	10.96	11.11	11.27	11.43	11.59	11.76
9	10.25	10.34	10.47	10.59	10.71	10.84	10.98	11.11	11.25	11.39	11.54	11.69	11.84	12.00	12.16	12.33	12.50	12.68	12.86	13.04
10	11.24	11.36	11.49	11.63	11.76	11.90	12.05	12.20	12.35	12.50	12.66	12.82	12.99	13.16	13.33	13.51	13.70	13.89	14.08	14.29
11	12.22	12.36	12.50	12.64	12.79	12.94	13.10	13.25	13.41	13.58	13.75	13.92	14.10	14.29	14.47	14.67	14.86	15.07	15.28	15.49
12	13.19	13.33	13.48	13.64	13.79	13.95	14.12	14.29	14.46	14.63	14.82	15.00	15.19	15.38	15.58	15.79	16.00	16.22	16.44	16.67
13	14.13	14.29	14.44	14.61	14.78	14.94	15.12	15.29	15.48	15.66	15.85	16.05	16.25	16.46	16.67	16.88	17.11	17.33	17.57	17.81
14	15.05	15.22	15.38	15.56	15.73	15.91	16.09	16.28	16.47	16.67	16.87	17.07	17.28	17.50	17.72	17.95	18.18	18.42	18.67	18.92
15	15.96	16.13	16.30	16.48	16.67	16.85	17.05	17.24	17.44	17.65	17.86	18.07	18.29	18.52	18.75	18.99	19.23	19.48	19.74	20.00
16	16.84	17.02	17.20	17.39	17.58	17.78	17.98	18.18	18.39	18.60	18.82	19.05	19.28	19.51	19.75	20.00	20.25	20.51	20.78	21.05
17	17.71	17.89	18.09	18.28	18.48	18.68	18.89	19.10	19.32	19.54	19.77	20.00	20.24	20.48	20.73	20.99	21 25	21.52	21.79	22.08
18	18.56	18.75	18.95	19.15	19.35	19.57	19.78	20.00	20.22	20.46	20.69	20.93	21.18	21.43	21.69	21.95	22.22	22.50	22.78	23.08
19	19.39	19.59	19.79	20.00	20.21	20.43	20.65	20.88	21.11	21.35	21.59	21.84	22.09	22.35	22.62	22.89	23.17	23.46	23.75	24.05
20	20.20	20.41	20.62	20.83	21.05	21.28	21.51	21.74	21.98	22.22	22.47	22.73	22.99	23.26	23.53	23.81	24.10	24.39	24.69	25.00
21	21.00	21.21	21.43	21.65	21.87	22.11	22.34	22.58	22.83	23.08	23.33	23.60	23.86	24.14	24.42	24.71	25.00	25.30	25.61	25.93
22	.....	22.00	22.22	22.45	22.68	22.92	23.16	23.40	23.66	23.91	24.18	24.44	24.72	25.00	25.29	25.58	25.88	26.19	26.51	26.83
23	.....	.....	23.00	23.23	23.47	23.71	23.96	24.21	24.47	24.73	25.00	25.27	25.56	25.84	26.14	26.44	26.74	27.06	27.38	27.71
24	.....	.....	.....	24.00	24.24	24.49	24.74	25.00	25.26	25.53	25.81	26.09	26.37	26.67	26.97	27.27	27.59	27.91	28.24	28.57
25	.....	.....	.....	.....	25.00	25.25	25.51	25.77	26.04	26.32	26.60	26.88	27.17	27.47	27.78	28.09	28.41	28.74	29.07	29.41
26	.....	.....	.....	.....	.....	26.00	26.26	26.53	26.80	27.08	27.37	27.66	27.96	28.26	28.57	28.89	29.21	29.55	29.89	30.23
27	.....	.....	.....	.....	.....	.....	27.00	27.27	27.55	27.84	28.12	28.42	28.72	29.03	29.35	29.67	30.00	30.33	30.68	31.03
28	.....	.....	.....	.....	.....	.....	.....	28.00	28.28	28.57	28.87	29.17	29.47	29.79	30.11	30.43	30.77	31.11	31.46	31.82
29	.....	.....	.....	.....	.....	.....	.....	.....	29.00	29.29	29.59	29.90	30.21	30.53	30.85	31.18	31.52	31.87	32.22	32.58
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	30.00	30.30	30.61	30.93	31.25	31.58	31.91	32.26	32.61	32.97	33.33
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31.00	31.31	31.63	31.96	32.29	32.63	32.98	33.33	33.70	34.07
32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32.00	32.32	32.65	32.99	33.33	33.68	34.04	34.41	34.78
33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33.00	33.33	33.67	34.02	34.38	34.74	35.11	35.48
34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34.00	34.34	34.69	35.05	35.42	35.79	36.17
35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35.00	35.35	35.71	36.08	36.46	36.84
36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36.00	36.36	36.73	37.11	37.50
37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	37.00	37.37	37.76	38.14
38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	38.00	38.38	38.78
39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.00	39.39
40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40.00

TABLE III.—*Percentage of loss in moisture resulting from drying, the loss in weight and the original moisture content being given.*

Loss in weight.	Original moisture content (per cent)—																			
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Per cent.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1	1.00	0.99	0.98	0.97	0.96	0.95	0.94	0.93	0.92	0.91	0.90	0.89	0.88	0.87	0.86	0.85	0.84	0.83	0.82	0.81
2	.....	2.00	1.98	1.96	1.94	1.92	1.90	1.88	1.86	1.84	1.82	1.80	1.78	1.75	1.73	1.71	1.69	1.67	1.65	1.63
3	.....	.....	3.00	2.97	2.94	2.91	2.88	2.85	2.81	2.78	2.75	2.72	2.69	2.66	2.63	2.60	2.57	2.54	2.50	2.47
4	.....	.....	.....	4.00	3.96	3.92	3.88	3.83	3.79	3.75	3.71	3.66	3.62	3.58	3.54	3.50	3.46	3.42	3.37	3.33
5	.....	.....	.....	.....	5.00	4.95	4.90	4.84	4.79	4.74	4.69	4.63	4.58	4.53	4.47	4.42	4.37	4.32	4.26	4.21
6	.....	.....	.....	.....	.....	6.00	5.94	5.87	5.81	5.74	5.68	5.62	5.55	5.49	5.43	5.36	5.30	5.23	5.17	5.11
7	.....	.....	.....	.....	.....	.....	7.00	6.93	6.85	6.77	6.70	6.62	6.55	6.47	6.40	6.32	6.25	6.17	6.10	6.02
8	.....	.....	.....	.....	.....	.....	.....	8.00	7.91	7.83	7.74	7.65	7.57	7.48	7.39	7.30	7.22	7.13	7.04	6.96
9	.....	.....	.....	.....	.....	.....	.....	.....	9.00	8.90	8.80	8.70	8.61	8.51	8.41	8.31	8.21	8.11	8.01	7.91
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	10.00	9.89	9.78	9.67	9.56	9.45	9.33	9.22	9.11	9.00	8.89
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11.00	10.88	10.75	10.63	10.51	10.38	10.26	10.13	10.01	9.89
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.00	11.87	11.73	11.59	11.46	11.32	11.18	11.05	10.91
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	13.00	12.85	12.70	12.55	12.40	12.25	12.10	11.95
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	14.00	13.84	13.67	13.51	13.35	13.19	13.02
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	15.00	14.82	14.65	14.47	14.30	14.12
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16.00	15.81	15.62	15.43	15.24
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	17.00	16.80	16.59	16.39
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18.00	17.78	17.56
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	19.00	18.76
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20.00
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Loss in weight.	Original moisture content (per cent)—																			
	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
Per cent.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1	0.80	0.79	0.78	0.77	0.76	0.75	0.74	0.73	0.72	0.71	0.70	0.69	0.68	0.67	0.66	0.65	0.64	0.63	0.62	0.61
2	1.61	1.59	1.57	1.55	1.53	1.51	1.49	1.47	1.45	1.43	1.41	1.39	1.37	1.35	1.33	1.31	1.29	1.27	1.24	1.22
3	2.44	2.41	2.38	2.35	2.32	2.29	2.26	2.23	2.20	2.16	2.13	2.10	2.07	2.04	2.01	1.98	1.95	1.92	1.89	1.86
4	3.29	3.25	3.21	3.17	3.13	3.08	3.04	3.00	2.96	2.92	2.88	2.83	2.79	2.75	2.71	2.67	2.62	2.58	2.54	2.50
5	4.16	4.11	4.05	4.00	3.95	3.89	3.84	3.79	3.74	3.68	3.63	3.58	3.53	3.47	3.42	3.37	3.32	3.26	3.21	3.16
6	5.04	4.98	4.91	4.85	4.79	4.72	4.66	4.60	4.53	4.47	4.40	4.34	4.28	4.21	4.15	4.09	4.02	3.96	3.89	3.83
7	5.95	5.87	5.80	5.72	5.65	5.57	5.49	5.42	5.34	5.27	5.19	5.12	5.04	4.97	4.89	4.82	4.74	4.67	4.59	4.52
8	6.87	6.78	6.70	6.61	6.52	6.43	6.35	6.26	6.17	6.09	6.00	5.91	5.83	5.74	5.65	5.57	5.48	5.39	5.30	5.22
9	7.81	7.71	7.62	7.52	7.42	7.32	7.22	7.12	7.02	6.92	6.82	6.73	6.63	6.53	6.43	6.33	6.23	6.13	6.03	5.93
10	8.78	8.67	8.56	8.44	8.33	8.22	8.11	8.00	7.89	7.78	7.67	7.56	7.44	7.33	7.22	7.11	7.00	6.89	6.78	6.67
11	9.76	9.64	9.52	9.39	9.27	9.15	9.02	8.90	8.78	8.65	8.53	8.40	8.28	8.16	8.03	7.91	7.79	7.67	7.54	7.42
12	10.77	10.64	10.50	10.36	10.22	10.09	9.95	9.82	9.68	9.54	9.41	9.27	9.14	9.00	8.86	8.73	8.59	8.45	8.32	8.18
13	11.80	11.66	11.51	11.36	11.21	11.06	10.91	10.76	10.61	10.46	10.31	10.16	10.01	9.86	9.71	9.56	9.41	9.26	9.11	8.97
14	12.86	12.70	12.53	12.37	12.21	12.05	11.88	11.72	11.56	11.40	11.23	11.07	10.91	10.74	10.58	10.42	10.26	10.09	9.93	9.77
15	13.94	13.76	13.59	13.41	13.24	13.06	12.88	12.71	12.53	12.35	12.18	12.00	11.82	11.65	11.47	11.29	11.12	10.94	10.76	10.59
16	15.05	14.86	14.67	14.48	14.29	14.10	13.90	13.71	13.52	13.33	13.14	12.95	12.76	12.57	12.38	12.19	12.00	11.81	11.62	11.43
17	16.18	15.98	15.77	15.57	15.36	15.16	14.95	14.75	14.54	14.34	14.13	13.93	13.72	13.52	13.31	13.11	12.90	12.70	12.49	12.29
18	17.34	17.12	16.90	16.68	16.46	16.24	16.02	15.80	15.59	15.37	15.15	14.93	14.71	14.49	14.27	14.05	13.83	13.61	13.39	13.17
19	18.53	18.30	18.06	17.83	17.59	17.36	17.12	16.89	16.65	16.42	16.18	15.95	15.72	15.48	15.25	15.01	14.78	14.54	14.31	14.07
20	19.75	19.50	19.25	19.00	18.75	18.50	18.25	18.00	17.75	17.50	17.25	17.00	16.75	16.50	16.25	16.00	15.75	15.50	15.25	15.00
21	21.00	20.73	20.47	20.20	19.94	19.67	19.40	19.14	18.87	18.61	18.34	18.08	17.81	17.54	17.28	17.01	16.75	16.48	16.22	15.95
22	.....	22.00	21.72	21.44	21.15	20.87	20.59	20.31	20.03	19.74	19.46	19.18	18.90	18.62	18.33	18.05	17.77	17.49	17.21	16.92
23	.....	.....	23.00	22.70	22.40	22.10	21.81	21.51	21.21	20.91	20.61	20.31	20.01	19.71	19.42	19.12	18.82	18.52	18.22	17.92
24	.....	.....	.....	24.00	23.69	23.37	23.05	22.74	22.42	22.11	21.79	21.47	21.16	20.84	20.53	20.21	19.89	19.58	19.26	18.95
25	.....	.....	.....	.....	25.00	24.67	24.33	24.00	23.67	23.33	23.00	22.67	22.33	22.00	21.67	21.33	21.00	20.67	20.33	20.00
26	.....	.....	.....	.....	.....	26.00	25.65	25.30	24.95	24.60	24.24	23.89	23.54	23.19	22.84	22.49	22.14	21.78	21.43	21.08
27	.....	.....	.....	.....	.....	.....	27.00	26.63	26.26	25.89	25.52	25.15	24.78	24.41	24.04	23.67	23.30	22.93	22.56	22.19
28	.....	.....	.....	.....	.....	.....	.....	28.00	27.61	27.22	26.83	26.45	26.06	25.67	25.28	24.89	24.50	24.11	23.72	23.33
29	.....	.....	.....	.....	.....	.....	.....	.....	29.00	28.59	28.18	27.77	27.37	26.96	26.55	26.14	25.73	25.32	24.92	24.51
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	30.00	29.57	29.14	28.71	28.28	27.86	27.43	27.00	26.57	26.14	25.71
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	31.00	30.55	30.10	29.65	29.20	28.75	28.30	27.86	27.41	26.96
32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32.00	31.53	31.06	30.59	30.12	29.65	29.18	28.71	28.24
33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	33.00	32.51	32.02	31.52	31.03	30.54	30.04	29.55
34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	34.00	33.49	32.97	32.46	31.94	31.43	30.91
35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	35.00	34.46	33.92	33.39	32.85	32.31
36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	36.00	35.44	34.88	34.31	33.75
37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	37.00	36.41	35.83	35.24
38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	38.00	37.39	36.77
39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	39.00	38.36
40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	40.00

TABLE IV.—*Percentage of moisture content after drying, the loss in weight and the original moisture content being given.*

Loss in weight.	Original moisture content (per cent)—																			
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Per cent.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1	0.00	1.01	2.02	3.03	4.04	5.05	6.06	7.07	8.08	9.09	10.10	11.11	12.12	13.13	14.14	15.15	16.16	17.17	18.18	19.19
2	.....	.00	1.02	2.04	3.06	4.08	5.10	6.12	7.14	8.16	9.18	10.20	11.22	12.25	13.27	14.29	15.31	16.33	17.35	18.37
3	.....	.....	.00	1.03	2.06	3.09	4.12	5.15	6.19	7.22	8.25	9.28	10.31	11.34	12.37	13.40	14.43	15.46	16.50	17.53
4	.....	.....	.....	.00	1.04	2.08	3.12	4.17	5.21	6.25	7.29	8.34	9.38	10.42	11.46	12.50	13.54	14.58	15.63	16.67
5	.....	.....	.....	.....	.00	1.05	2.10	3.16	4.21	5.26	6.31	7.37	8.42	9.47	10.53	11.58	12.63	13.68	14.74	15.79
6	.....	.....	.....	.....	.....	.00	1.06	2.13	3.19	4.26	5.32	6.38	7.45	8.51	9.57	10.64	11.70	12.77	13.83	14.89
7	.....	.....	.....	.....	.....	.....	.00	1.07	2.15	3.23	4.30	5.38	6.45	7.53	8.60	9.68	10.75	11.83	12.90	13.98
8	.....	.....	.....	.....	.....	.....	.....	.00	1.09	2.17	3.26	4.35	5.43	6.52	7.61	8.70	9.78	10.87	11.96	13.04
9	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.10	2.20	3.30	4.39	5.49	6.59	7.69	8.79	9.89	10.99	12.09
10	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.11	2.22	3.33	4.44	5.55	6.67	7.78	8.89	10.00	11.11
11	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.12	2.25	3.37	4.49	5.62	6.74	7.87	8.99	10.11
12	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.13	2.27	3.41	4.54	5.68	6.82	7.95	9.09
13	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.15	2.30	3.45	4.60	5.75	6.90	8.05
14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.16	2.33	3.49	4.65	5.81	6.98
15	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.18	2.35	3.53	4.70	5.88
16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.19	2.38	3.57	4.76
17	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.20	2.41	3.61
18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.22	2.44
19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.23
20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00
21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
22	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
23	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
24	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
27	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

Loss in weight.	Original moisture content (per cent)—																			
	21.	22.	23.	24	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.
Per cent.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
1	20.20	21.21	22.22	23.23	24.24	25.25	26.26	27.27	28.28	29.29	30.30	31.31	32.32	33.33	34.34	35.35	36.36	37.37	38.38	39.39
2	19.39	20.41	21.43	22.45	23.47	24.49	25.51	26.53	27.55	28.57	29.59	30.61	31.63	32.65	33.67	34.69	35.71	36.73	37.76	38.78
3	18.56	19.59	20.62	21.65	22.68	23.71	24.74	25.77	26.80	27.84	28.87	29.90	30.93	31.96	32.99	34.02	35.05	36.08	37.11	38.14
4	17.71	18.75	19.79	20.83	21.87	22.92	23.96	25.00	26.04	27.08	28.12	29.17	30.21	31.25	32.29	33.33	34.38	35.42	36.46	37.50
5	16.84	17.89	18.95	20.00	21.05	22.11	23.16	24.21	25.26	26.32	27.37	28.42	29.47	30.53	31.58	32.63	33.68	34.74	35.79	36.84
6	15.96	17.02	18.09	19.15	20.21	21.28	22.34	23.40	24.47	25.53	26.60	27.66	28.72	29.79	30.85	31.91	32.98	34.04	35.11	36.17
7	15.05	16.13	17.20	18.28	19.35	20.43	21.51	22.58	23.66	24.73	25.81	26.88	27.96	29.03	30.11	31.18	32.26	33.33	34.41	35.48
8	14.13	15.22	16.30	17.39	18.48	19.57	20.65	21.74	22.83	23.91	25.00	26.09	27.17	28.26	29.35	30.43	31.52	32.61	33.70	34.78
9	13.19	14.29	15.38	16.48	17.58	18.68	19.78	20.88	21.98	23.08	24.18	25.27	26.37	27.47	28.57	29.67	30.77	31.87	32.97	34.07
10	12.22	13.33	14.44	15.56	16.67	17.78	18.89	20.00	21.11	22.22	23.33	24.44	25.56	26.67	27.78	28.89	30.00	31.11	32.22	33.33
11	11.24	12.36	13.48	14.61	15.73	16.85	17.98	19.10	20.22	21.35	22.47	23.60	24.72	25.84	26.97	28.09	29.21	30.33	31.46	32.58
12	10.23	11.36	12.50	13.64	14.78	15.91	17.05	18.18	19.32	20.46	21.59	22.73	23.86	25.00	26.14	27.27	28.41	29.55	30.68	31.82
13	9.20	10.34	11.49	12.64	13.79	14.94	16.09	17.24	18.39	19.54	20.69	21.84	22.99	24.14	25.29	26.44	27.59	28.74	29.89	31.03
14	8.14	9.30	10.47	11.63	12.79	13.95	15.12	16.28	17.44	18.60	19.77	20.93	22.09	23.26	24.42	25.58	26.74	27.91	29.07	30.23
15	7.06	8.24	9.41	10.59	11.76	12.94	14.12	15.29	16.47	17.65	18.82	20.00	21.18	22.35	23.53	24.71	25.88	27.06	28.24	29.41
16	5.95	7.14	8.33	9.52	10.71	11.90	13.10	14.29	15.48	16.67	17.86	19.05	20.24	21.43	22.62	23.81	25.00	26.19	27.38	28.57
17	4.82	6.02	7.23	8.43	9.64	10.84	12.05	13.25	14.46	15.66	16.87	18.07	19.28	20.48	21.69	22.89	24.10	25.30	26.51	27.71
18	3.66	4.88	6.10	7.32	8.54	9.76	10.98	12.20	13.41	14.63	15.85	17.07	18.29	19.51	20.73	21.95	23.17	24.39	25.61	26.83
19	2.47	3.70	4.94	6.17	7.41	8.64	9.88	11.11	12.35	13.58	14.82	16.05	17.28	18.52	19.75	20.99	22.22	23.46	24.69	25.93
20	1.25	2.50	3.75	5.00	6.25	7.50	8.75	10.00	11.25	12.50	13.75	15.00	16.25	17.50	18.75	20.00	21.25	22.50	23.75	25.00
21	.00	1.27	2.53	3.80	5.06	6.33	7.60	8.86	10.13	11.39	12.66	13.92	15.19	16.46	17.72	18.99	20.25	21.52	22.78	24.05
22	.....	.00	1.28	2.56	3.85	5.13	6.41	7.69	8.97	10.26	11.54	12.82	14.10	15.38	16.67	17.95	19.23	20.51	21.79	23.08
23	.....	.....	.00	1.30	2.60	3.90	5.19	6.49	7.79	9.09	10.39	11.69	12.99	14.29	15.58	16.88	18.18	19.48	20.78	22.08
24	.....	.....	.....	.00	1.31	2.63	3.95	5.26	6.58	7.89	9.21	10.53	11.84	13.16	14.47	15.79	17.11	18.42	19.74	21.05
25	.....	.....	.....	.....	.00	1.33	2.67	4.00	5.33	6.67	8.00	9.33	10.67	12.00	13.33	14.67	16.00	17.33	18.67	20.00
26	.....	.....	.....	.....	.....	.00	1.35	2.70	4.05	5.40	6.76	8.11	9.46	10.81	12.16	13.51	14.86	16.22	17.57	18.92
27	.....	.....	.....	.....	.....	.....	.00	1.37	2.74	4.11	5.48	6.85	8.22	9.59	10.96	12.33	13.70	15.07	16.44	17.81
28	.....	.....	.....	.....	.....	.....	.....	.00	1.39	2.78	4.17	5.55	6.94	8.33	9.72	11.11	12.50	13.89	15.28	16.67
29	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.41	2.82	4.23	5.63	7.04	8.45	9.86	11.27	12.68	14.08	15.49
30	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.43	2.86	4.29	5.72	7.14	8.57	10.00	11.43	12.86	14.29
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.45	2.90	4.35	5.80	7.25	8.70	10.14	11.59	13.04
32	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.47	2.94	4.41	5.88	7.35	8.82	10.29	11.76
33	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.49	2.98	4.48	5.97	7.46	8.96	10.45
34	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.51	3.03	4.54	6.06	7.57	9.09
35	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.54	3.08	4.61	6.15	7.69
36	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.56	3.12	4.69	6.25
37	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.59	3.17	4.76
38	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.61	3.23
39	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00	1.64
40	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.00